The Wrack Line

Newsletter of Parker River National Wildlife Refuge • Newburyport, MA

United States Fish & Wildlife Service — Winter, 2015

On the Move With a Very Special Snowy Owl!

By Kaytee Hojnacki, Biological Technican

By now, most of us are well aware that snowy owls can be found at Parker River NWR during most winters. In some years only a few sightings are reported on the refuge. In other years, like this one, multiple owls can be spotted in a single day. Most of you have probably heard the term "irruption" in reference to these birds, which is a common occurrence for not only snowy owls, but several other species of birds that typically spend their winters further north (e.g., crossbills, redpolls, pine siskins). When large numbers of a particular species migrate to an area not typically within their normal range, this is referred to as an irruption. In the past, the general consensus was that irruptions were caused by abnormally scarce winter food sources, forcing birds to move south in search of food. While this might be the case for the smaller forest birds, researchers are finding that this isn't the case for snowy owls. To get a better understanding of why snowy owl irruptions occur, a diverse group of researchers last winter formed Project SNOWStorm to take advantage of last year's massive irruption.

Norman Smith addresses a crowd before releasing a snowy owl.

Their continued research is shedding some fascinating light on the movements of the birds, and recent results have a personal connection to the refuge.

On March 15, 2014, Massachusetts Audubon's Norman Smith, a well-known owl researcher, released a juvenile female snowy owl at Lot 1 in front of a large crowd. Nicknamed "Century," this owl was outfitted with a GPS/GSM transmitter (which collects GPS information and later transmits the information to researchers using cell phone towers) as part of Project SNOWStorm. After spending some time at the refuge and surrounding area, she moved south through Boston, into RI and CT, before heading back north through MA, NY, and, eventually, on to Quebec. After April 6, the researchers no longer received reports about her whereabouts. That is, until she was back in southern Quebec within cell phone range on November 30. Not all her data has been downloaded yet, but the data through mid-June shows her spending the summer on the tundra of the Ungava Peninsula in very northern Quebec. Check out her map on the Project SNOWStorm website to see her travels in detail. Who knows, maybe she'll keep heading south this winter and join us in New England again!

Photos: Matt Poole/FWS

From the Manager's Desk...

By Bill Peterson, Refuge Manager

Happy New Year! I hope everyone enjoyed the holidays and has explored the refuge during our many mild winter days. I spent the final week of 2014 duck hunting, bird watching, clamming, and relaxing with my family and am now anxiously awaiting a good snowfall to try out my new cross-country skis. In the meantime, January is the month for evaluating what happened at Parker River NWR in 2014 and setting my goals for the refuge in 2015.

As we highlighted in the last edition of *The Wrack Line*, 2014 was a banner year for the refuge's piping plovers. Many factors contributed to our new record of 60 fledged chicks, including the refuge's efforts to minimize human disturbance during the nesting and pre-fledge periods. Thanks to the work of refuge gatehouse staff, volunteer plover wardens, and law enforcement officers, we achieved our 2014 goal of no human-caused plover nest abandonments. We will strive to achieve this goal again in 2015.

The Hellcat Wildlife Observation Area trail is the best place to explore the refuge interior and learn about Plum Island's wildlife and plants. Replacing the trail's two 35 year-old boardwalks has been a high refuge priority for several years; however, to date we haven't obtained the needed project funding. My goal for 2015 is to develop a phased boardwalk replacement plan, identify how summer youth hires can contribute, and determine whether Service staff from other refuges can assist us with removing the existing boardwalks.

The "Goodwin Camp" (cottage), located on the southern tip of Plum Island, and the "Pink House," located on Plum Island Turnpike, recently became refuge property.


Bill Peterson, Refuge Manager

Both distinguished buildings are in severe disrepair and pose substantial refuge liabilities, necessitating the sites' closure to public entry. We completed cultural resources assessments, contaminants surveys, and other prerequisite steps for removing these structures in 2014; however, the refuge has not finalized a removal timeline. My goal for 2015 is to finalize this timeline and remove both buildings. Once basic access trails are established, these beautiful areas will be opened for public use.

Our draft CCP, the refuge's 15 year management plan, is progressing towards the public comment period phase and my goal is to release this document for review and commenting in Summer, 2015. We'll widely publicize the comment period and I urge everyone to engage in this planning process for your national wildlife refuge.

I'm excited about the prospect of witnessing my first spring bird migration in the Great Marsh, beginning our busy summer field season, and catching my first striped bass. But, for the next two months, I'm hoping for snow!

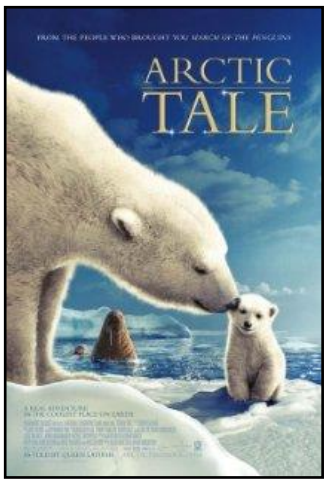

Photo: Matt Poole/FWS

Visitor Services Update: Something for Everyone!

By Matt Poole, Visitor Services Manager

Hi Folks! Even though many seem to experience winter as a relatively quiet time of year, not so for your visitor services department! Here's an update on some of the things we have in the pipeline:

Refuge Family Cinema: We recently purchased a one year umbrella film screening license that permits the refuge to publicly screen nearly any "Hollywood–caliber" film that you can think of. Seem too good to be true? Well it is… true! The only hitch is that we can't charge a fee for any of the screenings. Given that we don't charge for public programs anyway – that's not a problem! This winter's *Refuge Family Cinema* is the first way in which we are leveraging the value of the screening license. On a number of Sunday afternoons across the winter – through late March – such popular films as *Finding Nemo, The Lion King, Artic Tale, and The Lorax* will be projected on the big screen in the visitor center auditorium. Movie selection wasn't done "willy nilly;" each film has an environmental theme or message. To add to our visitors' cinematic experience, the Friends of Parker River are providing popcorn and bottled water. To those who might accuse us as having gone (partially) Hollywood – guilty as charged! All films to be shown in a given month are listed in our regular monthly program schedule, which is accessible through the refuge homepage.



American Conservation Film Festival – NORTH: One of the benefits of having spent eight years teaching and running courses at the U.S. Fish and Wildlife Service's National Conservation Training Center (in Shepherdstown, WV), was getting to know a lot of really great, creative people who were, and remain, involved in a dizzying array of "boffo" special events. For the last 15 years or so, one such annual event has been the *American Conservation Film Festival*. Each fall the training center, working with a number of local partners, stands-up a weekend-long, multi-venue festival during which nationally and internationally recognized, conservation-related films are publicly screened. In that fifteen year period the festival has gradually grown into a pretty big deal. Inspired by that success, it occurred to me that we could (or should!) launch our very own "mini" conservation film festival right here at Parker River – and so we shall!

AMERICAN CONSERVATION FILM FESTIVAL

Parker River's nascent film festival – the *American Conservation Film Festival NORTH* – is slated for March 6th – 8th. Some of the same films that were shown in West Virginia last fall will be screened right here in Newburyport. These include such award-winning films as *Chasing Ice* (which dramatically chronicles the melting of the glaciers in the far north), *From Billions to None* (about the extinction of the passenger pigeon), and *Flight of the Butterflies* (about monarch butterflies and originally produced as an IMAX film). We will also host a very special Saturday evening session when a brand-spanking-new documentary about Rachel Carson will be premiered. The new film will be introduced by Dr. Patricia DeMarco, a nationally recognized Carson scholar, and who will have travelled all the way from Pittsburgh to be with us that evening. With the final schedule for the film festival nearly complete, please be on the alert for some serious event marketing to begin in the next week or so.


Rachel Carson

Let's Go Outside! A relatively simple notion, right? The title of this new, and pretty major special event, will take place here at the refuge – rain or shine – on Saturday, June 20th. Inspired by the Department of Interior's national initiative of the same name, *Let's Go Outside!* will provide kids, their family members, and others with the opportunity to try out or sample a wide array of healthy outdoor activities including archery target shooting, surf fishing, kayaking, tide pooling, biking, bird watching, clamming, and nature photography. This event, while simple in concept, is really a multi-tentacled

organism. In other words, we need help to plan and implement this event. If interested in helping, please get me on the phone or send me an email. Now is not too soon! My direct line is (978) 465-5753, ext. 210. Email: matt_poole@fws.gov.


Photo: Matt Poole/FWS

Tide pooling will be among the activities offered during Let's Go Outside!

Refuge Naturalist Program, Take 2!: 22 applicants were recently selected to participate in a second offering of our thirteen month-long Refuge Naturalist Program. The program is designed for refuge volunteers who want to be involved in the design and/or delivery of visitor services programs – and, more specifically, environmental education and interpretive programming. This is the approach we are taking to build capacity in our visitor services department. And, in a time of diminishing budgets, it's really the only way to build that capacity.

Training sessions will take place one Saturday each month, generally from 9:00 am to 3:00 pm. Each session will focus on a different habitat and the key species that live there. Participants will also learn about on-going research, specific resource challenges, and refuge management activities that pertain to that habitat. Instructors will be drawn from refuge staff, outside subject matter experts, and volunteers who matriculated through the first convening of the Refuge Naturalist Program (formerly the Master Naturalist Program). The typical training day will be comprised of an hour or two in the classroom followed by time spent outdoors on the national wildlife refuge. Thanks are due to some wonderful people who are serving with me on the program coordination team: Ellie Bailey, Patty Evans, Kate Murray, and John Halloran. You folks rock!

Behind the Scenes at that *Other* Refuge: Finally, I wanted to remind everyone that we *DO* have other national wildlife refuges to support and administer out of the Newburyport office! One such refuge which, once upon a time, actually had its own staff, is Great Bay NWR (in Newington, NH). Last fall, manager Bill Peterson suggested that we start doing our behind-the-scenes-style tours at Great Bay. To make a long story short, we were able to lead two very successful tours at the refuge before excessive rains, a rising water table, and freezing temperatures made the off-road aspects of the tour shaky, at best, in a rear-wheel-drive passenger van. The folks who did participate in the tours – most of whom were from the greater Portsmouth area – appeared to uniformly rave about the experience. So, needless to say, these popular tours will start-up again in the spring, once the Great Bay landscape has dried out. There are also plans to pilot a bicycle-based behind-the-scenes tour there. As with all of our scheduled programs, keep an eye on the refuge web site for news and updates.


Photo: Matt Poole/FWS

Kids learn how to fish at a refuge event

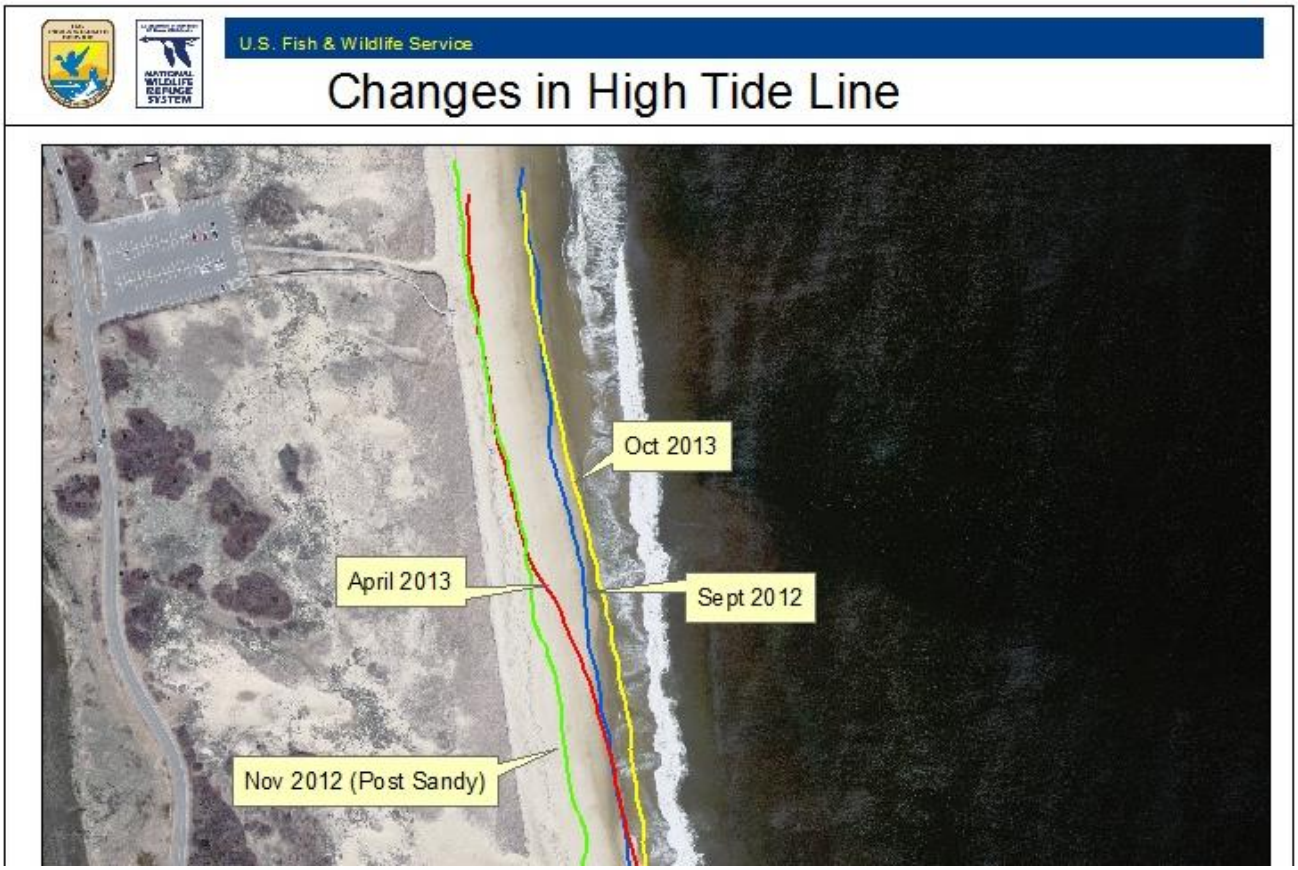
Monitoring Change:

How Will Plum Island Fare in the Face of Climate Change?

By Nancy Pau, Wildlife Biologist

There's been a lot of attention on storm surge and beach erosion on Plum Island in the past few years. At the refuge, we have been monitoring climate change for a number of years, but the impacts of climate change are not always the same on the refuge as it is on the rest of Plum Island. While beach erosion on the north end of Plum Island has caused significant property loss, beach erosion on the refuge hasn't had the same impact due to the lack of infrastructure on the dunes. As a protected wildlife refuge, we can allow these natural erosion and accretion cycles to occur, recognizing its important role in maintaining the pristine beaches and dunes that are enjoyed by wildlife and people.

However, we have been noticing more frequent and stronger storms in recent years, so we started a program to monitor how the beach and dunes change over time. We monitor two different measurements to understand beach change. One is measuring the high tide line twice a year, another is monitoring the elevation change of a number of beach cross-sections from the road to the water. With 4 years of data, it appears that while the beach and the foredunes are eroding and accreting in some areas, we're not seeing a net loss of beach. This is corroborated by historical data provided by The MA Shoreline Change Project, with maps going back to the mid-1800s. While Plum Island beaches have experienced a lot of change, as expected of a barrier island, there does not seem to be a westward migration of the beach and dunes, as experienced in other areas of the east coast. In fact, the increased storminess may have a temporary benefit to beach nesting birds, including piping plover and least terns. The recent stronger storms have reworked the foredune, making the slope gentler and creating wash over areas in the foredunes that's been ideal habitat for the piping plover. The dune transect monitoring is also showing that there's not a lot of change in the dunes—most of the



Beaches are Plum Island are dynamic, typically losing beach during winter and gaining during summers. This map shows the loss of beach near Lot 1 during Hurricane Sandy in October of 2012, and the accretion during the winter and summer of 2013. Note: major erosion on Plum Island occurred in June 2012 and during Nemo in February 2013.

Change is happening right at the foredunes or on the beach itself. The exception is Sandy Point at the south end of Plum Island, where we're seeing large shifting of sands on the beach and dunes from season to season. Going forward, we're expecting to see more change, but with the data we gathered and historical data from the MA Coastal Zone Management, we now have a baseline for comparing changes that we see in the future.

While the local community has largely focused on beach erosion as the major negative impact from climate change, Refuge staff and local conservation groups have been focusing on changes in the salt marshes. The increasing storminess combined with rising sea levels have created more flooding in our salt marshes, with alarming consequences. While salt marshes are common here, they are actually quite a rare habitat, occupying less than 1% of the world's land mass. Salt marshes occur as a fringe of habitat between land and ocean and play a critical role in both ecosystems. The salt marsh on the Refuge is part of the 20,000 acre Great Marsh, the largest salt marsh system north of Long Island. It plays a significant role in protecting homes, providing nursery and nutrients to recreational fish and shellfish, and is the backbone of many local economies (soft-shell clams, fishing, tourism, birding, etc).

The latest projections estimate that the sea level in Boston will rise 2 to 6 feet by the end of this century. In a salt marsh system, centimeters determine the type of habitat: salt hay marsh, low marsh, or mudflats, and millimeters determine the success or failure of birds nesting in the salt marshes. Like beach systems, salt marshes are not static. They have the ability to accrete to keep up with sea level rise. In fact, the faster the sea level rise, the faster they will accrete... up to a certain point. One of the ways we're monitoring how our salt marshes are doing is by monitoring accretion rates using Sediment Elevation Tables. Called SETs for short, these installations allow us to measure several aspects of a marsh's natural processes. SETs are stainless steel rods that are driven down deep in the salt marsh, preferably in the bedrock. This makes sure that the equipment doesn't move with ice heaving and that we always have a constant point of reference to compare readings across years. A reading arm with pins attaches to the rod and tells us the elevation of the surface of the marsh.

Refuge staff take careful elevation measurements using a Sediment Elevation Table in a salt marsh to mon-

Our monitoring to date indicates that our salt marshes are keeping up with sea level rise. The measured SLR in Boston is 2.6 mm a year. The salt marshes we're measuring are accreting at a rate of 1.9 to 8 mm a year, depending on the rate of flooding at the site being monitored. The concern going forward is that as sea level rise increases, the marshes will not have sufficient biomass and sediment to keep up, and we will start losing marsh. This monitoring program will give us early warning signs of approaching this threshold. In the meanwhile, we are working to provide salt marshes the best chances of survival. We're working with partners to understand the sediment supply, and with local towns to allow as much natural flow as possible to provide sediment that is so critical the marsh being able keep up with sea level rise.

In addition to monitoring beach and salt marsh, we're keeping an eye on all other changes related to a changing climate. All this monitoring paid off when we were able to take advantage of funding opportunity after Hurricane Sandy. The Refuge received $441k in Sandy recovery funding and worked with partners to receive another $2.9 million. With this funding, the Refuge and its partners will be implement a wide variety of restoration and management projects to make the Great Marsh more resilient and protect wildlife and human community from future storm impacts.

These days, I've adopted the old adage, "Change is the only constant" as my motto. It's comforting to know that there are some traditional tools, such as these monitoring programs, to help us gauge where we stand in this constantly changing environment and whether management actions we take are having any impacts.

Parker River's Youth Conservation Corps:
40+ Years of Teen-Powered Improvements for Refuge Visitors

By the Refuge Archive Team, comprised of Alix McArdle, Kate Murray, and Karen Stahle


Building boardwalks has been a staple YCC activity for 40+ years.

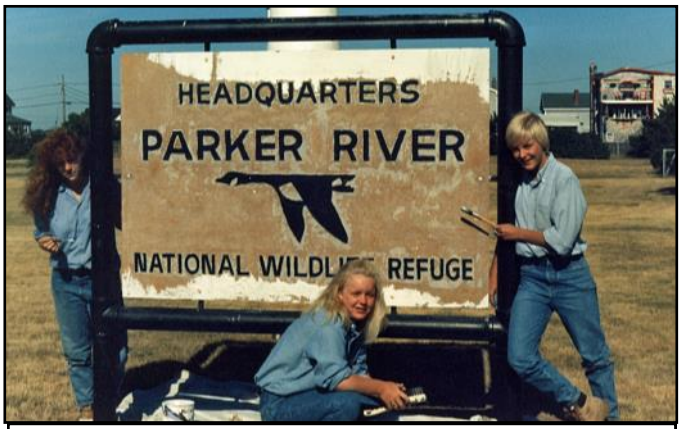
Inspired by F.D.R.'s Civilian Conservation Corps of the 1930s, the Youth Conservation Corps (YCC) was established nationally in 1970 as a small pilot program aimed at introducing young Americans to conservation career opportunities on public lands. Parker River, under then manager Ed Moses, was among the first federal sites to host YCC. In 1972, its first year, boardwalks were built at Lots 4 and 6, a fishing pier was constructed on the North Pool for the use of Camp Sea Haven, and the abandoned wells from former Grape Island cottages were filled. During the next three years, 6,250 linear feet of elevated boardwalk were built for the Hellcat Swamp Nature Trail.

YCCers built a fishing pier for Camp Sea Haven kids.

Mal Fraser began working with Parker River's YCC in 1973 and served thereafter as its Director until 2012. During the 1970s and 1980s twenty students (sometimes less) were chosen by lottery from as many as two hundred applicants. Students worked (at minimum wage) a 40-hour week, 30 on assigned duties and 10 in environmental education. First day orientation for the 8-week session, frequently led by current Assistant Manager Frank Drauszewski, included a clear declaration of the program goals; first aid and CPR training; and instruction emphasizing YCC's community, environmental, historical, and educational value. Mr. Fraser, a mostly chemistry teacher (with some environmental and physical science classes) at Georgetown High School, prioritized from day one the necessity of team work. Though most of the young participants (always 50% female) were meeting for the first time, over the course of the summer they would grow into a highly functioning self-policing unit that not only achieved great results but also came to appreciate the importance of teamwork. Mal credits the PRNWR Staff, noting especially the biologists and Tom Stubbs ("a hard worker and good problem solver who taught the kids how to work together") with demonstrating the strengths created by shared endeavor. "The key was team work," he emphasizes. "We worked hard and we worked together."


Former YCC Director Mal Fraser and Dep Mgr Frank Drauszewski

"Brushing" or clearing brush overgrown along trails and boardwalks was among the first tasks given the new recruits. This, of necessity given the



Maintenance tasks included repainting signs.

The "stuff " that makes for great memories—helping out the biologists with "goose roundups!"

prevalence of poison ivy on the Island, included the first instructions in plant identification. Other beginner tasks included painting, building swallow boxes, and the goose banding drive wherein young preflight geese were rounded up, banded, examined, and released. As the teams bonded, developed skills, and learned to work together, the assignments grew in scope and complexity to include trail blazing, boardwalk construction and maintenance, laying the concrete foundation at the boat launch opposite Lot 1, even building a 40' tower at Sub-Headquarters with a wind powered generator to "run lights and small motors" (1977 Annual Report). In 1988 the Hellcat Swamp Nature Trail was officially closed due to dangerously deteriorating conditions. It was YCC that made the repairs necessary for its reopening. And in the early 1980s, YCC covered the entrance gate due to insufficient temporary staff. There were overnight expeditions for trail work at Parker River's sister sites: Rachel Carson (Maine), Wapack (New Hampshire), and at Massasoit. In 1987 and 1988, a Parker River YCC crew spent a week at Monomoy on Cape Cod (then under Parker River's auspices) in a "spike" (temporary tents) camp building a lengthy staircase. All the while, ten hours each week were spent in environmental education, which included field work and

It's not every day that you get to hold and band a Canada goose!

instruction with the biologists, removing invasive plants, monitoring nesting sites, setting traps for snapping turtles in the impoundments, and bird identification and behaviors, some sessions with Bill Forward. Mal mentions the marsh sparrow research project among the student favorites, but also makes clear that students who did not enjoy the field work (insects in the salt marshes in the summer can be overpowering) were not forced to participate, but could carry on with whatever their current assignment was.

Federal funding for YCC was eliminated in 1981, though some refuges (including Parker River) con-

YCC workers helped to build the refuge boat launch.

tinue the program at reduced levels under 'special project funding' from their local budgets. In its peak year, 1978, YCC enrolled 46,000 students nationally and during its first ten years provided "earn while you learn" opportunities for 213,300 young people. Plans at PRNWR for 2015 will be posted on the Refuge website and a press release will be issued.

Records are not kept on how many YCC participants have gone on to careers in environmental areas, but we know that Parker River's most recent former Manager, Graham Taylor, was a YCCer at Great Swamp NWR (New Jersey) as a teenager.

"If you build it, they will come." YCC-built boardwalks now support 250,000 refuge visitors each year.

A Partnership Approach to Managing "*Public Enemy Number 1"*

By Frances Toledo-Rodriquez
Biological Technician

Invasive species are often referred to as "Public Enemy No. 1" on national wildlife refuges. Invasive species can be animals or plants. An extensive list of invasive plants can be found on Parker River NWR. One of our biggest management challenges is perennial pepperweed (*Lepidium latifolium*). Pepperweed is an aggressive, non-native plant which is increasingly threatening the integrity of salt marshes throughout southern New England. As of summer 2014 1,427 stands of pepperweed had been identified in central and southern New England, from Kittery, Maine to the Boston Harbor Islands.

Perennial pepperweed can be found in salt marshes and estuaries, wetlands, and riparian areas, and is also known to invade disturbed areas like roadsides as well. Pepperweed spreads through seed distribution as well as through rhizome spreading. The root structure of pepperweed is extensive, penetrating at least 60 cm into the soil. Root fragments as small as 2.5 cm are able to re-sprout and grow into multi-stemmed plants. Pepperweed is a prolific producer of seeds that can float though waterways and distribute across the marsh surface. In areas with wet, saline conditions, pepperweed forms dense, monotypic stands which displace native plants. Our concern is that if allowed to spread unchecked, pepperweed may continue to expand its range into other habitats, degrading salt marshes and displacing species like the New England cottontail and salt marsh sparrow, which depend on these habitats for food and shelter.

Perennial pepperweed is native to Eurasia. In the 1930's the plant was introduced to the United States through a shipment of sugar beet seeds. Since that time, pepperweed has become a serious problem on the West Coast – infiltrating roadsides, riversides and pasture lands. Pepperweed is present in all states west of the Rocky Mountains. In New England, infestations of pepperweed are mainly found near the coast and on coastal islands. Stands often occur at the upper edges of salt marshes, above the high-tide line, frequently forming dense stands. It also occurs in disturbed areas along roadways. In 2006, pepperweed was confirmed in New Hampshire. In 2013 it was found in southern Maine. Since 2006, the U.S. Fish and Wildlife Service and Massachusetts Audubon have concentrated increasing attention and resources on controlling pepperweed in the Great Marsh.

During the 2014 season, 849 pepperweed sites in the Great Marsh region were treated (Table 1) protecting over 1,580 acres. Seventy percent (70%) of the known sites were treated in 2014 and 70 sites which previously had pepperweed were found to be clear of the plant (Figure 1). The Pepperweed Control Project has taken responsibility for coordinating pepperweed control in the Great Marsh.

Treatment Type	Number of Sites
Hand Pull	328
Early Pull followed by late season Spray	15
Herbicide Spray	506
Total sites treated	849
Clear-monitored sites with no pepperweed in 2014	70
Previously mapped, untreated	375
Total Great Marsh Sites	1295

Table 1: 2014 Pepperweed treatments in the Great Marsh region.

In total, 30,000 acres have been mapped for pepperweed, and 20,000 acres have been found clear of the plant. 10,000 acres are infested with pepperweed or under imminent threat from it.

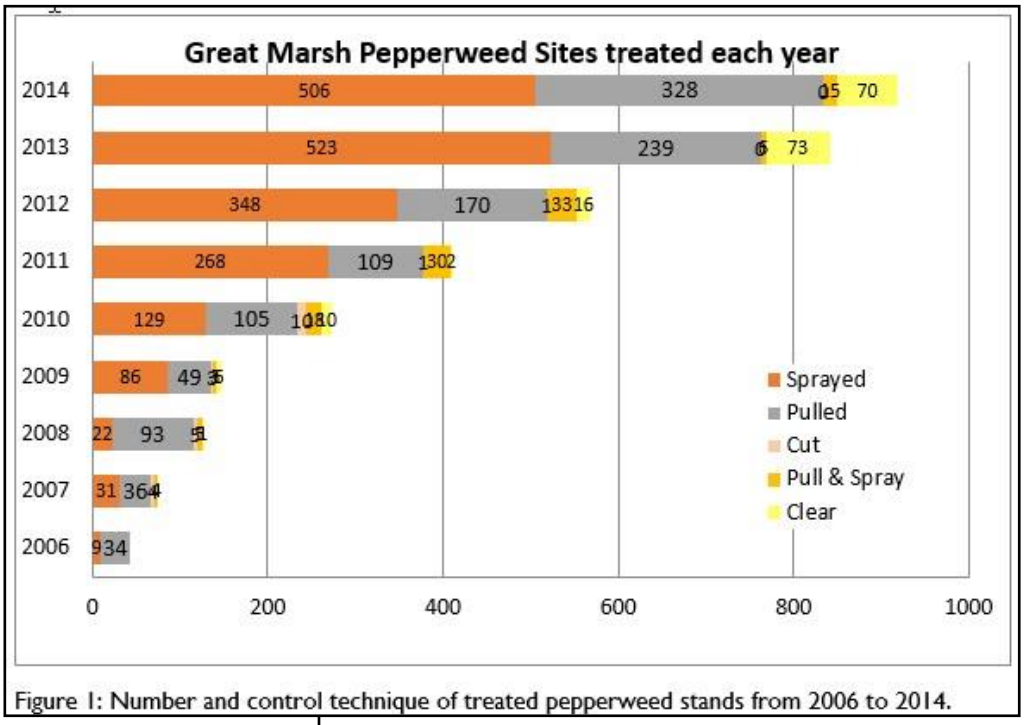


Figure 1: Number and control technique of treated pepperweed stands from 2006 to 2014.

Volunteer support is the key to the success of the pepperweed project. In 2014 volunteers gave over 1,500 hours to the project. Volunteers came from schools, colleges, clubs, conservation organizations, community groups and interested individuals. Volunteers are involved in every part of the project; they participate in pulls, lead groups, adopt sites, apply herbicide, conduct outreach, obtain landowner permission, help transport volunteers and licensed applicators by boat, and map pepperweed locations. Without their donated time and skills, the project would not be successful. A great example of the community support that we received is the continued participation of the Newburyport Gulf of Maine Institute Team (GOMI) that continued to "step up" in 2014 to lead pulls in West Newburyport. This partnership between the Pepperweed Project and the GOMI team is very important to success. Other school groups that significantly helped with this project are: Ipswich High School (Ipswich), River Valley Charter School (Newburyport, Grades 4-6), and the Sparhawk High School (Amesbury). Assistance was also provided by Essex County Correctional Facilities, the Plum Island Beautification Society and Carol Robey's family (Gloucester).

Volunteers are needed to help pull and monitor this invasive plant in Salisbury, Amesbury, Newburyport, Newbury, Rowley, Ipswich, Essex, and Seabrook, NH this coming summer. Our goal is to control or eradicate pepperweed before it becomes as pervasive as phragmites (common reed) or purple loosestrife – two very widespread invasive plants in New England. Volunteers are essential to the success of the pepperweed control project. Last year, with the help of volunteers, we were able to treat 70% of our identified sites, with over 1,500 hours of donated time. Since the beginning of this group in 2006, volunteers have donated a total of 9,305 hours! If you're interested in helping with this project, please email your name, contact information (email or phone), and the town in which you would like to volunteer, to Frances Toledo-Rodriguez at Frances_Rodriguez@fws.gov or (978) 465-5753 ext. 203.

The River Valley Charter School students pulling pepperweed at Old Point Road site during 2014.

The Unseen World Below the Snow Pack…

By Linda Schwartz, Volunteer Master Naturalist

It was the dead of winter and not a creature was stirring, or so you thought…,
"Subnivean zone" refers to the zone under the snow (not that we have seen a lot of that this year yet!). Subnivean comes from Latin "sub" meaning under and "nives" meaning snow. Basically, the area between the ground
surface and the snow is alive with activity.

As the snow melts you may have observed the maze-like structures that appear — little tunnels under the snow. Those are made by little creatures such as mice, voles and shrews. They are essentially highways to their food and sleeping areas. Many animals can inhabit this zone—one that you almost never see until your cat, an owl, a fox or some other predator catches one of the creatures for dinner. Perhaps you've seen a fox suddently dive headlong into the snow, only to emerge a moment later with dinner in its maw.

The subnivean zone can form in a couple of ways. One is the snow is literally held up by the branches and twigs or leaf debris, forming a small area between the snow and the branches. Another way it can form is as the ground warms a bit, it melts the snow and creates the space beneath the snow. The water vapor from the melting snow rises and creates an icy ceiling. The air in the subnivean zone remains humid and at a near a steady 32 degrees, quite the little spa for these little creatures!

The subnivean environment is important to both the creatures that live within it and many predators that remain in the area in winter. Their lives depend on the little critters beneath the snow. So while you may hate all the tunnels you see under the snow, just remember that the animals that create them are feeding all those beautiful hawks and owls. Many people have been getting photographs of owls eating meadow voles lately. Owls, hawks, coyotes, foxes and others have very acute hearing which enables them to hear the small creatures as they move below the snow. The predator will then pounce on the snow with the hope of coming up with dinner. And sometimes they are rewarded. The animals that inhabit these tunnels do come out occasionally and may then be a prime target for a hungry predator. They also make air holes to allow the carbon dioxide produced by their exhalations to escape.

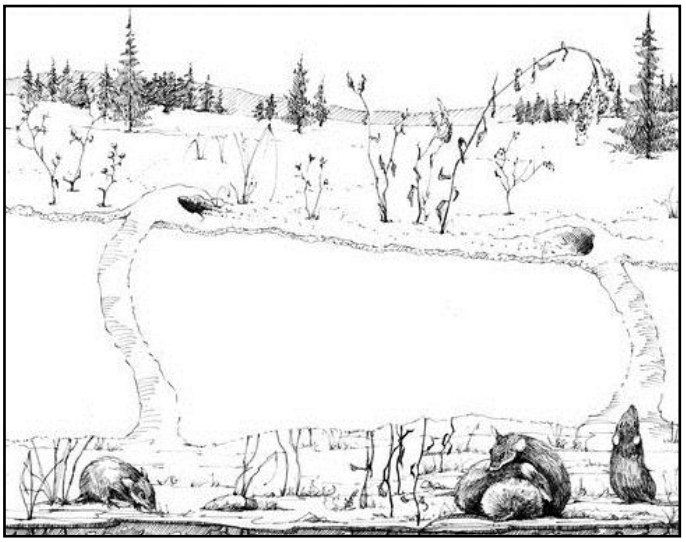


Illustration by Adelaide Tyrol

This zone of warmer (20- 30 degree F) temperatures is important to small animals like mice and voles. Because of their small size they lose more heat to the environment and are not able to grow a thick or warm enough coat like many larger animals can to keep warm. Because their body surface is large in proportion to their size, they lose heat rapidly and it takes a lot of energy (food) to replace it. Think of it the next time your tiny little dog is shivering in the cold, yet your big dog isn't cold at all. Thick, warm coats insulate by trapping dead air to act as insulation. That is why a down coat can be so warm- it traps a lot of heat in all its' fluff. A tiny animal just doesn't have all the surface area to trap a lot of air. The insulating blanket of snow not only keeps out the cold air, but the biting wind, which just causes more heat loss from a warm body.

Many of the animals that inhabit this zone in the winter do not develop white coats, a notable exception being the short-tailed weasel (or ermine). This makes them prime targets for hungry predators when they venture out on top of the snow. Voles and other prey species in the subnivean zone have many predators. These can include the owls, hawks and foxes from above, and the short-tailed weasel that makes itself at home in this zone. Weasels may not only eat the voles, but may take over their tunnels and make them their home.

Food is much easier to find in this subnivean environment than on top of the snow. The inhabitants of such a zone are able to nibble on seeds, bark and other foodstuffs they may have cached in the fall. The less these animals have to venture out on top of the snow, the better for them.

An Important Link in the Refuge Food Web:

The Meadow Vole: A Little Mammal with a Big Job!

By Linda Schwartz, Volunteer Master Naturalist

A meadow vole (*Microtus pennsylvanicus*) is the kind of rodent that many may mistake for a mouse. They have a tail that is shorter than their body length (about 1/3 the length of the body). The tail is a good mark to distinguish them from mice, whose tails are at least the lengths of their bodies. Meadow voles are one of the most common voles in North America. Unfortunately for the voles, they are also an important food source for many predators, particularly during the winter months. In some locales they can comprise the most abundant species of small mammals. There are 3 species of vole found in Massachusetts, the most common being the meadow vole. There are also woodland voles (*Microtus pinetorum*) and southern red-backed voles (*Myodes gapperi*).

The meadow vole lives in grassy fields, woodland marshes and near lakes and rivers. They are quite small; measuring 3.5-5 inches, not including the sparsely furred tail. The tail adds another 1.4-2.6 inches. They weigh approximately 1.5 ounces. They have dull, brown fur on their back, with a silvery grey belly. Their genus *Microtus* refers to their small ears, which are barely visible in their fur.

The meadow vole population can reach densities of 150 individuals per acre in marshy habitat during peak years. Peak years occur at roughly two to five year intervals. With these numbers they can form pretty extensive colonies. Even though they live in colonies, they are rather aggressive towards each other, with the female maintaining a territory and the male not being very territorial. Voles breed throughout most of the year, generally stopping between January and March. During the non-breeding months they can form groups of up to 7 in a nest, presumably to conserve heat. Their litters consist of 1-11 young, with 4-6 being the average. The females can breed at 28 days of age and have a 21 day gestation period. The young are independent after approximately 21 days. A vole has to pack a lot of living into a short lifespan – generally less than a year in the wild. (They can live a little more than 2.5 years, if successful in avoiding predators.) Their short lifespan is not surprising, given all of the animals that consider them dinner!

These tiny creatures survive on bark, roots, tubers and seeds in the winter months. They will also eat berries. Voles have also been known to eat carrion, insects and other invertebrates. Voles can consume more than ½ their body weight in food; it takes a lot of energy to keep a small creature warm. The smaller the animal, the larger the ratio of surface area to their size, and the more heat they will lose. Voles have a very high metabolism and have to eat every two or three hours to maintain their energy levels.

Voles can cause crop damage by nibbling on roots and stripping bark. That is only a problem when there are large numbers of them, or if they are in your garden or orchard. They are helpful creatures in that they aerate soil and recycle nutrients from the grass that they eat and the droppings that they leave behind. They also spread the spores of beneficial fungi that live on plant roots.

Photo: Andre Moraes

Federal Wildlife Officers Share Their Training & Expertise with Colleagues

By Christopher Husgen, Federal Wildlife Officer

When I first came to Parker River NWR, almost 19 years ago, I did not know much about waterfowl hunting, and had never checked a hunter in the field. This past fall, I taught two classes on waterfowl hunting, waterfowl identification, and techniques for checking waterfowl hunters. The goal of the class was to provide the officers with the tools which would allow them to effectively identify waterfowl, recognize violations of hunting laws and regulations, and make hunter contacts.

In early October, a captain from the Massachusetts Environmental Police (MEP) called me to ask if I would be interested in conducting a class for a group of rookie MEP officers. I jumped at the opportunity to share my passion of waterfowl hunting with the new officers.

The captain explained that a lot of officers come from the police academy, where they are told that any person with a gun is a threat. In contrast, federal and state game wardens regularly contact people throughout the hunting season that are using guns as part of a legal recreational activity. Although safety is always a concern when working around firearms, the hunter is not the "bad guy" for possessing and shooting a shotgun to hunt ducks or geese.

Federal Wildlife Officers, like myself, and Environmental Police Officers both enforce waterfowl hunting regulations and are often referred to as game wardens. There are many laws and regulations for waterfowl hunters, and understanding and enforcing them can seem intimidating. I am able to share real life examples of enforcing the regulations, which can make these laws more accessible. I am also an avid waterfowl hunter, and I think it is important to relate some of the challenges that an ethical waterfowl hunter may encounter. I remember how difficult it was for me to put all of the pieces together, and had to learn mostly on my own.

As a rule, I wouldn't want to sit in class as a student and have an instructor read me a regulation and, as an instructor, I certainly don't take that approach. Using slides, wings, mounts and frozen ducks, I began the waterfowl ID section with a focus on the common species found in the area and their distinguishing characteristics: toes, wing color and bill. I taught them to first identify whether the duck had a lobed or un-lobed hind toe (a feature that most birders would not consider, but a key element for the game warden with a bird in hand). Next, I reviewed the colored portion of the wing (the speculum) and, finally, the bill – another unique characteristic of a duck. Using a guide that I had provided, the participants were able to identify the species by matching -up bills with the drawings.

Parker River's Officer Christopher Husgen recently provided training for MA environmental police officers.

When reviewing the regulations, I was able to present the regulation and then share stories of actual waterfowl violations that I have seen or investigated. I engaged the class by posing several "what if" questions to the officers, so that they had to put themselves in the situation in which they would have to make a decision. A waterfowl hunter needs to have a hunting license, and both a state and federal duck stamp, and the federal stamp needs to be signed. These are simple things to check, and not difficult regulations to interpret. However, if a hunter is sitting along the Merrimack River and shoots at a duck, and the duck appears to fly away, but then lands hundreds of feet away, is there a concern? Is there a violation? These are the questions that I have had to consider, and I hope other officers will be observant of the same things.

As a Field Training Officer, I teach a system to an officer who is learning to check waterfowl hunters. One technique is to first introduce themselves, establish that the hunter is hunting, check the license and stamps, check the shotgun, the shells, and the bag (the ducks that the hunter is holding in the field). Prior to making the contact, an officer would ideally have observed the hunter in the field. Did they fire more than three shells out of their gun? A shotgun is only allowed to hold a maximum of three shells. Did the hunter retrieve, or make a reasonable effort to retrieve, all of the birds that they knocked down? The law states that they must. Did they show you all of the birds that they shot or might they be concealing some? These are some of the questions that an experienced game warden would consider. In my experience, most hunters comply with the regulations, or are open to learning how to comply. There are very few that intentionally break the law.

The safety considerations for an officer checking waterfowl hunters are often more complex than other types of law enforcement. It usually occurs along the

the water, or in a boat, far from help, and the best duck hunting is usually in the worst weather. All waterfowl hunters will have a shotgun, or possibly a bow/arrow, and the shotgun is most likely loaded when you make the contact. Providing clear direction in the handling of the shotgun can better protect everyone. These factors are important to the safety of the officer and hunter. A game warden can manage the variables as best as possible to provide the best chance for a safe experience. A float plan, multiple methods of communication, plenty of hot tea with honey, extra clothes, dry socks, and a first aid kit are a good start.

I really enjoyed sharing my experiences with the new Environmental Police Officers and was particularly pleased when I was able to work with one of those same officers just a week later on opening day. He joined me in the refuge boat for the day and we contacted many hunters with a few violations and had a really good time. About a month later, I was asked to instruct another class for the MEP. Of course I said yes, and although it fell on my day off, my wife understood. I had even more time to prepare, and brought a lot more stuff!

I know that by working together, Massachusetts Environmental Police Officers and Federal Wildlife Officers can better protect the resources of the refuge and the Great Marsh.

A successful and happy trainee and the instructor-father, participants in the first Junior Waterfowl Training Program at Parker River NWR in 1965. (Photo and caption from an old refuge "annual narrative report.")

Members of the Council of the League of Essex County Sportsmen's Clubs select sites and stakeout locations to be used in the first Junior Waterfowl Training Program in 1965 (Photo and caption from an old refuge "annual narrative report.")

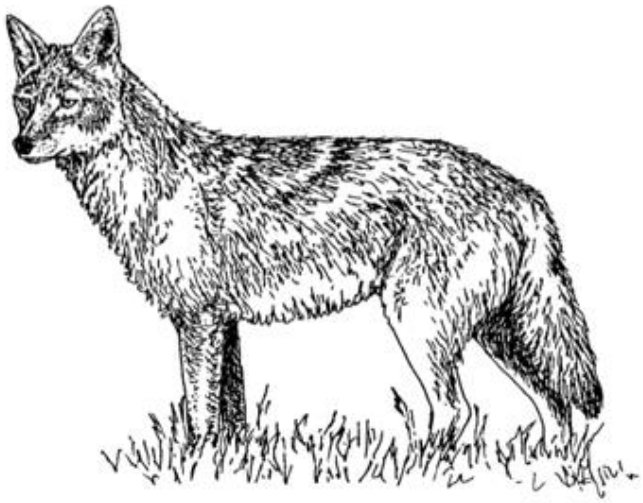
Meet Refuge Volunteer
Ray Whitley!

By Jean Adams, Outdoor Recreation Planner

Ray Whitley has been a wonderful addition to the refuge visitor center staff. He has an easy going demeanor and extensive knowledge of the refuge, which comes in handy at the information desk. Ray has a genuine love of nature and for teaching people about nature. It is easy to see how he was everyone's favorite teacher at Triton (he didn't say this but I am sure it was so). I know we are very fortunate to have Ray as part of our staff and the visitor is fortunate to have Ray greet them at the center.

Ray was kind enough to answer some questions for us (If the questions had been about weather or chickens, this would be a much longer article! Ray is an expert on both!). Here is that interchange:

How long have you volunteered? Do you volunteer elsewhere? I have been a volunteer at the Refuge since the spring of 2012. I also help out at the Maria Miles Welcome Center on Route 95 south.
What did you do before you started to volunteer? I am a retired Middle school teacher. I taught 7th grade Earth Science for 24 years at Triton Regional Middle School in Byfield , MA



What do you do as a volunteer at Parker River? What is your favorite job? I am a greeter at the main desk at the visitor center I also help with the training of new volunteers that apply as greeters for the refuge. I enjoy greeting people and providing a pleasant atmosphere for them to become aware of the importance of our mission at the refuge.

Any favorite memories that stand out? My memories include the excitement I get from meeting people from around the world that come to the refuge to learn the importance of providing a safe haven for the wildlife that we have around us! My experience in earth science gives me the background knowledge to express the vital mission we have at the refuge! I am impressed with the professionalism and dedication of the staff at the refuge! They support the volunteers and promote the fact that we all are working toward a positive goal!

Any advice to other volunteers? I would encourage anyone who has the time to get involved with the refuge. You will meet many nice people and gain a satisfaction that you are contributing to a great cause!

Help the Refuge By Becoming a FRIEND!

By Jean Adams, Outdoor Recreation Planner

Do you have any interest in helping out the refuge and becoming a member of The Friends of Parker River? If so , you are encouraged to attend their monthly board meetings (the next one being February 21) here at refuge headquarters. As a Friends member, you can help with fundraising (which benefit's the refuge) and help promote the refuge's mission though public advocacy.

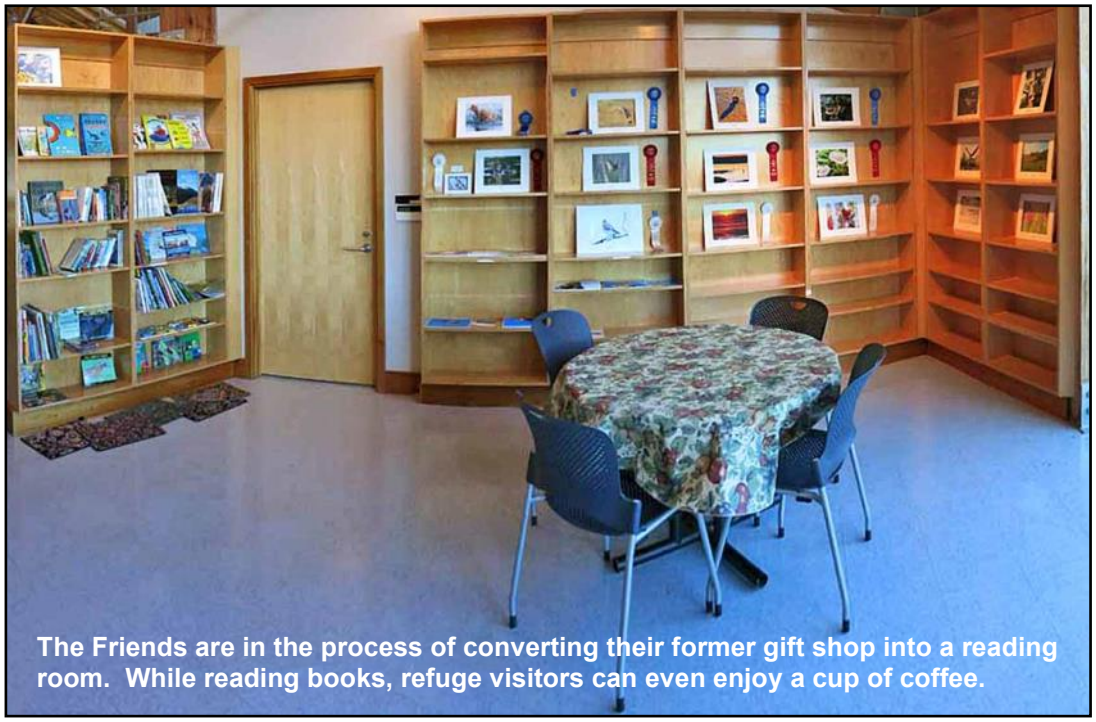
In the past, the Friends of Parker River have helped with beach cleanups, special events such as Let's Go Fishing and the Eagle Festival. This year they'll play a key role in the Let's Go Outside extravaganza. If you know how to surf fish, you would be a welcome help on the beach that day (June 20)!

Most recently, the Friends have set up a new coffee and reading room in the space formerly occupied by the Plover's Nest Gift Shop. The room is stocked full of educational and fun reading material, has free Wi-Fi and even a coffee machine. It is open 7 days a week from 8:30 am to 4:00 pm. Stop by to browse, enjoy a cup of java and learn about the benefits of being a Friends member.

Keeping pace with technology, the Friends are now working on purchasing a "Discover Nature" app (DNA) for Parker River NWR. DNA products are smartphone apps that increase the visitor experience on wlldlife refuges, national parks, and national recreation areas. These apps are geared towards teenagers and young adults where the use of smartphone technology has increased rapidly. The DNA app was first released at J.N. "Ding" Darling NWR and has been well received. It is the hope of the Friends that this app could enhance the visitors' experience and encourage exploration of public lands.

Visit the Friends on the web: http://www.parkerriver.org/

If you are at all interested in the Friends of Parker River, please consider attending the board meeting on Feb 21 at 9am at Parker River Headquarters or the annual membership meeting on March 21 at noon (also at headquarters). This is the perfect time to join as there is a need for new energetic board and general members. No preregistration is required and attendance does not obligate you to join. For more information, please visit the Friends website.



The Friends are in the process of converting their former gift shop into a reading room. While reading books, refuge visitors can even enjoy a cup of coffee.

Can you identify the animal species that left behind each of these tracks?
Hint #1: Each species is a year round resident and may be active in winter.
Hint #2: Tracks are NOT to scale!

To check your answers, see the answer sheet on the refuge web site:
http://www.fws.gov/uploadedFiles/Region_5/NWRS/North_Zone/Parker_River_Complex/Parker_River/Sections/Publications_Download_Page/

A Few Random Refuge "Kodak Moments"

Ranger Poole's ball cap served as a bird feeder during a recent Photographic Society photo safari to MA Audubon's Ipswich River Sanctuary in Topsfield.

A Romanian dance troupe visited the refuge last fall!

Refuge fee collector Tom Rurak serenades refuge staff with polka music during the Christmas potluck.

This jumping spider, which almost landed on Ranger Poole's head, quickly became a macro photography opportunity—an image that was then posted to the photo club's Facebook page, accompanied by the rhetorical question "Is this Wildlife Photography?"

These are refuge law enforcement vehicles in Alaska during the 1950s. Styles have changed just a little!

The Wrack Line, official newsletter of Parker River National Wildlife Refuge, is generally published on a quarterly basis—fall, winter, spring, and summer.

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